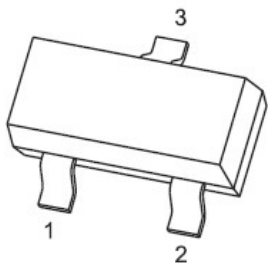
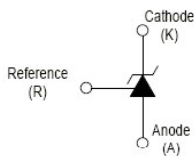


**SOT-23**
**SOT-23 Adjustable Accurate Reference Source**


- 1. REFERENCE
- 2. CATHODE
- 3. ANODE

**Equivalent Circuit**

**MARKING: 431**
**DEVICE DESCRIPTION**

The TL431 is a three-terminal adjustable shunt regulator offering excellent temperature stability. This device has a typical dynamic output impedance of  $0.2\ \Omega$ . The device can be used as a replacement for zener diodes in many applications.

**FEATURES**

- The output voltage can be adjusted to 36V
- Low dynamic output impedance, its typical value is  $0.2\ \Omega$
- Trapping current capability is 1 to 100mA
- Low output noise voltage
- Fast on-state response
- The effective temperature compensation in the working range of full temperature
- The typical value of the equivalent temperature factor in the whole temperature scope is  $50\ \text{ppm}/^\circ\text{C}$

**APPLICATION**

- Shunt Regulator
- High-Current Shunt Regulator
- Precision Current Limiter

**Mechanical Data**

- 封装: SOT-23 封装 SOT-23 Small Outline Plastic Package.
- 环氧树脂 UL 易燃等级 Epoxy UL: 94V-0.
- 安装位置: 任意 Mounting Position: Any.

极限值和温度特性( $T_A = 25^\circ\text{C}$  除非另有规定)

**Maximum Ratings & Thermal Characteristics** (Ratings at  $25^\circ\text{C}$  ambient temperature unless otherwise specified.)

参数 Parameters	符号 Symbol	数值 Value	单位 Unit
Cathode Voltage	$V_{KA}$	36	V
Cathode Current Range(Continuous)	$I_{KA}$	-100~+150	mA
Reference Input Current Range	$I_{ref}$	0.05~+10	mA
Power Dissipation	$P_D$	300	mW
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Operating Temperature	$T_{opr}$	-25~+85	$^\circ\text{C}$
Thermal Resistance From Junction to Ambient	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$

电特性 ( $T_A = 25^\circ\text{C}$  除非另有规定)

**Electrical Characteristics** (Ratings at  $25^\circ\text{C}$  ambient temperature unless otherwise specified).

参数 Parameter	符号 Symbols	测试条件 Test Condition	界限 Limits			单位 Unit
			Min	Typ	Max	
Reference input Voltage	$V_{ref}$	$V_{KA} = V_{REF}\ \text{V}, I_{KA} = 10\ \text{mA}$	2.475	2.5	2.525	V
Deviation of reference input voltage over temperature(note)	$\Delta V_{ref}/\Delta T$	$V_{KA} = V_{REF}, I_{KA} = 10\ \text{mA}$ $T_{MIN} \leq T_A \leq T_{MAX}$		4.5	17	mV
Ratio of change in reference Input voltage to the change in cathode voltage	$\Delta V_{ref}/\Delta V_{KA}$	$I_{KA} = 10\ \text{mA}$	$\Delta V_{KA} = 10\ \text{V} \sim V_{REF}$	-1.0	-2.7	mV/v
			$\Delta V_{KA} = 36\ \text{V} \sim 10\ \text{V}$	-0.5	-2.0	mV/v
Reference input current	$I_{ref}$	$I_{KA} = 10\ \text{mA}, R_1 = 10\ \text{k}\Omega, R_2 = \infty$		1.5	4	$\mu\text{A}$
Deviation of reference input current over full temperature	$\Delta I_{ref}/\Delta T$	$I_{KA} = 10\ \text{mA}, R_1 = 10\ \text{k}\Omega, R_2 = \infty$ $T_A = -25\ \text{to}\ 85^\circ\text{C}$		0.4	1.2	$\mu\text{A}$
Minimum cathode current for regulation	$I_{KA}(\text{min})$	$V_{KA} = V_{REF}$		0.45	1.0	mA
Off-state cathode current	$I_{KA}(\text{off})$	$V_{KA} = 36\ \text{V}, V_{REF} = 0$		0.05	1.0	$\mu\text{A}$
Dynamic impedance	$Z_{KA}$	$V_{KA} = V_{REF}, I_{KA} = 1\ \text{to}\ 100\ \text{mA}, f \leq 1.0\ \text{kHz}$		0.15	0.5	$\Omega$

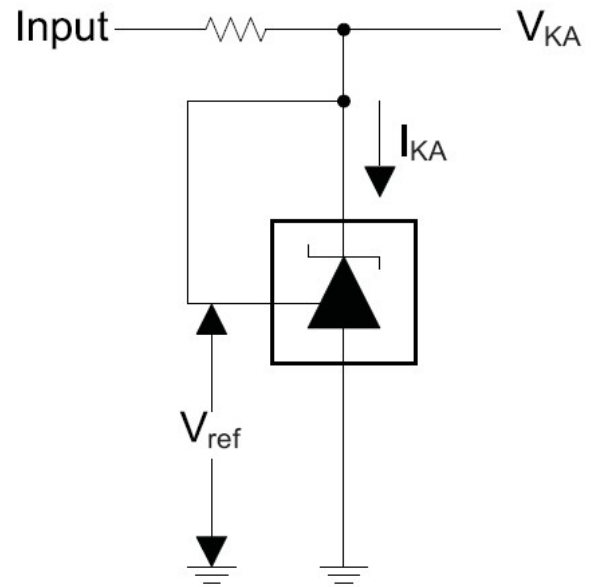
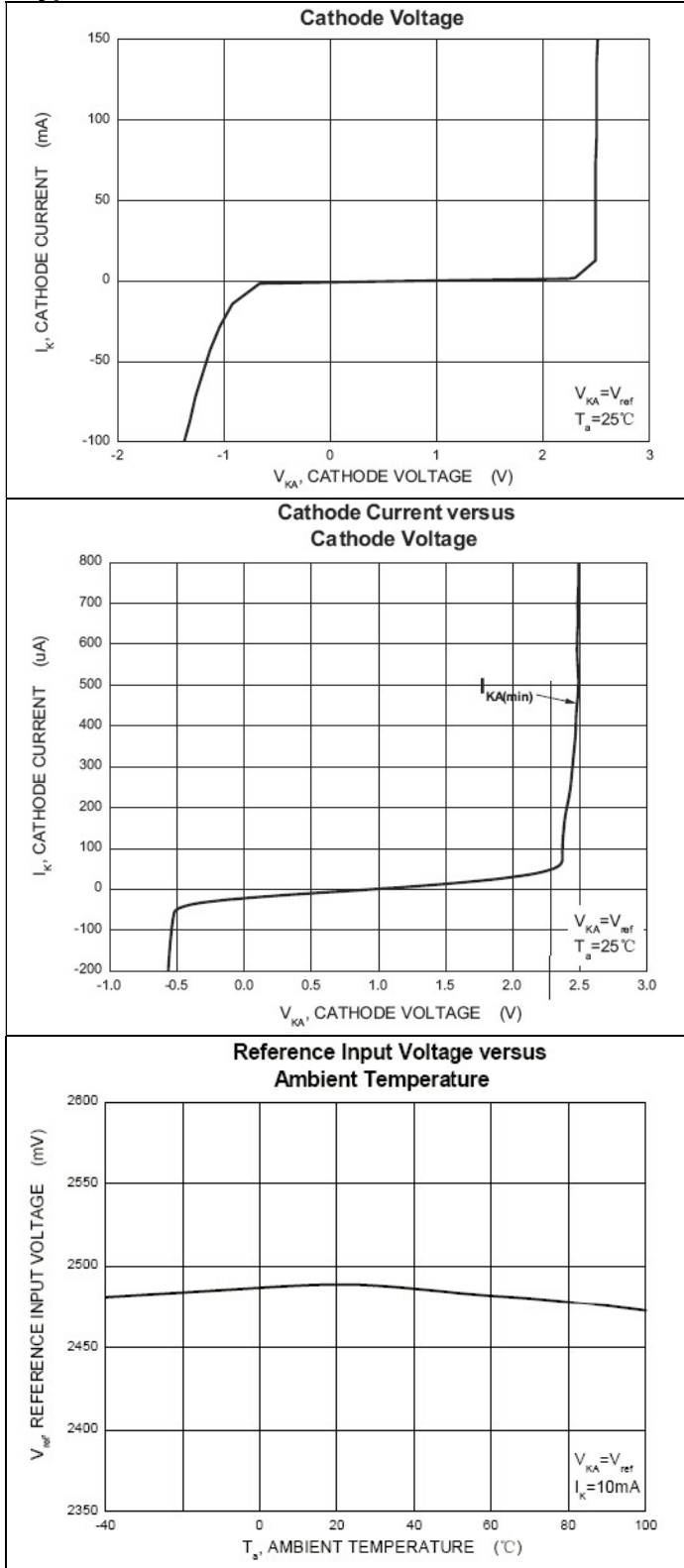
Note:  $T_{MIN} = -25^\circ\text{C}$ ,  $T_{MAX} = +85^\circ\text{C}$ .

CLASSIFICATION of  $V_{ref}$

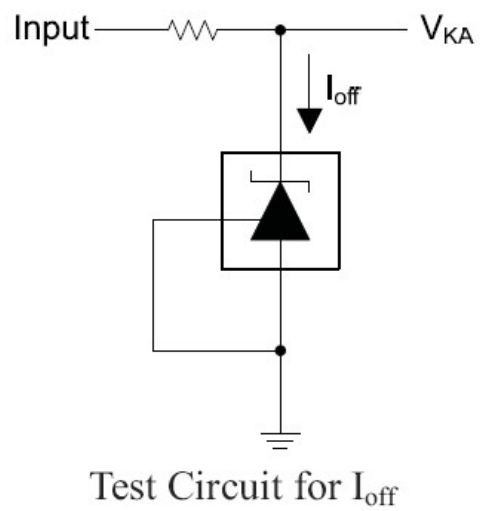
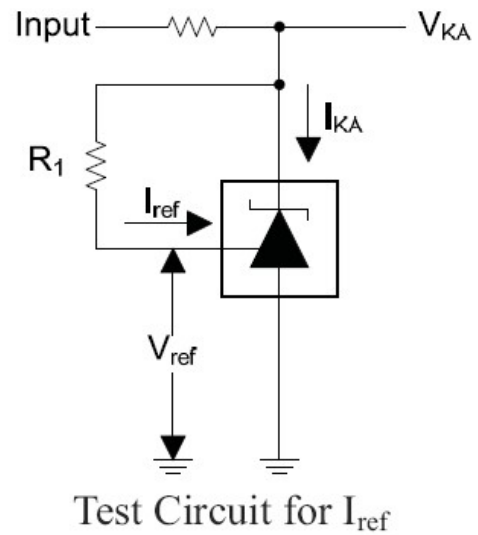
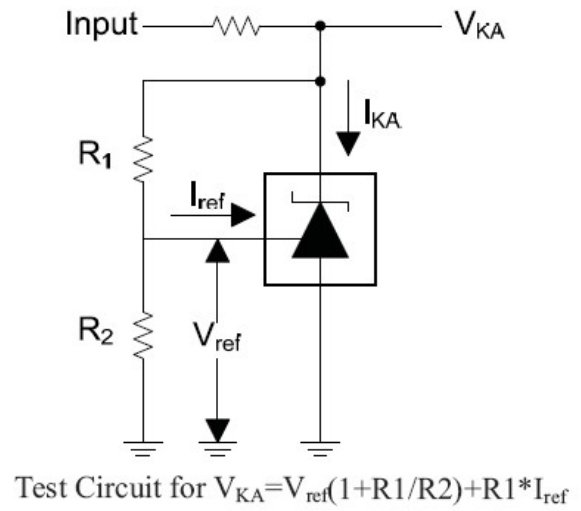
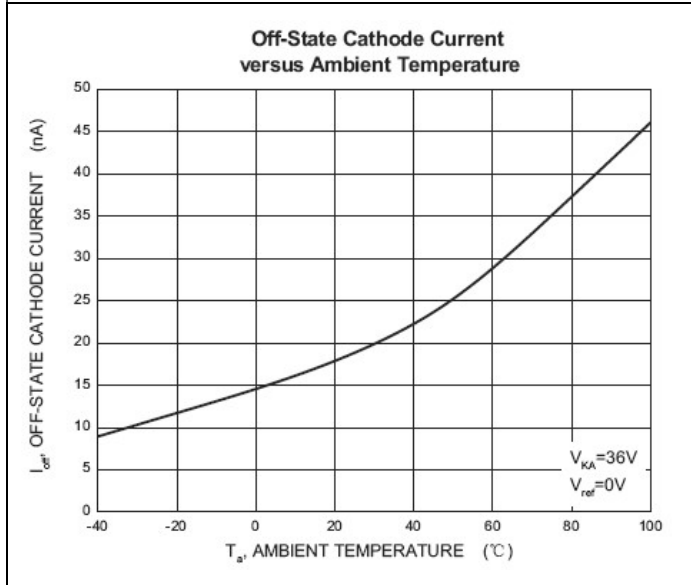
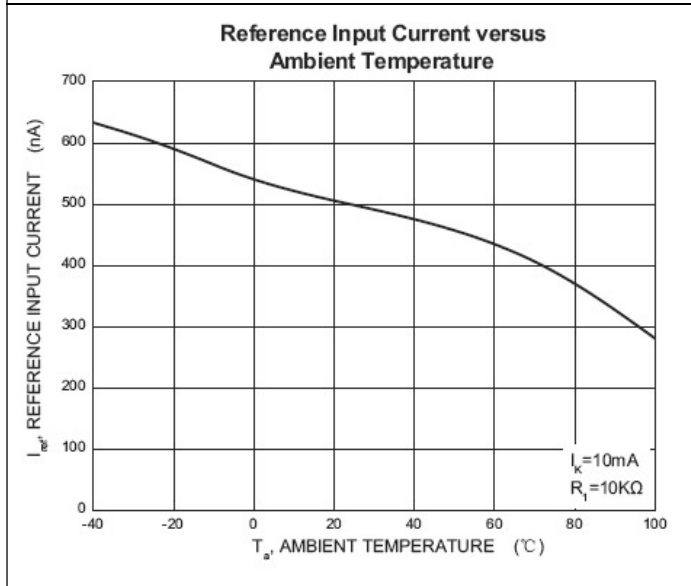
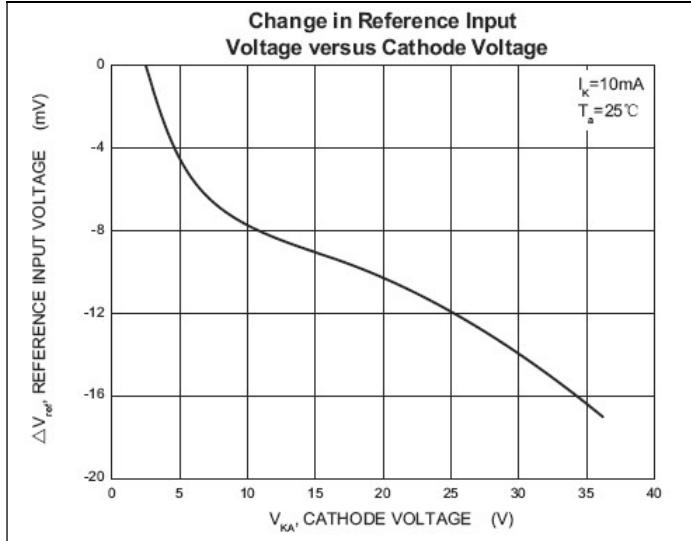
Rank	0.5%	1%
Rank	2.487-2.513	2.475-2.525



Typical characteristics

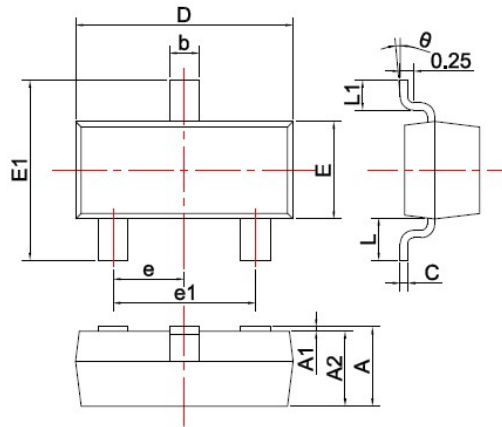


Test Circuit for  $V_{KA} = V_{ref}$





**SOT-23 PACKAGE OUTLINE** Plastic surface mounted package

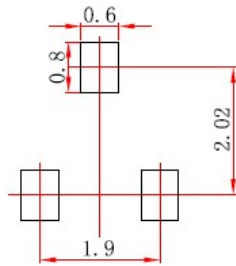


SYMBOL	DIMENSIONS	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

Unit: mm

**焊盘设计参考** Precautions: PCB Design

Recommended land dimensions for SOT-23 diode. Electrode patterns for PCBs



- Note:
1. Controlling dimension: in millimeters.
  2. General tolerance:  $\pm 0.05\text{mm}$ .
  3. The pad layout is for reference purposes only.

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